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ROAD LOG OF THE GEOLOGY IN THE NORTHERN APPALACHIAN VALLEY OF VIRGINIA

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This road log has been prepared to provide the location and brief description of outcrops that represent much of the stratigraphic section in the northern Appalachian Valley in Virginia. Bibliographic citations are listed at the end of the log to assist those who are unfamiliar with the literature dealing with this portion of the State. Generalized columns of stratigraphic formations are included to assist the user in establishing the stratigraphic framework (Tables 1, 2).

The user of this road log should keep in mind that automobile odometers vary in accuracy. The Augusta, Frederick, Page, Rockingham, Shenandoah, and Warren county road maps of the Virginia Department of Highways, and the U.S. Geological Survey 7.5-minute series topographic maps are recommended for use with this road log. The county road maps are available for 10 cents each plus 4 percent sales tax from the Information Office, Virginia Department of Highways, 1221 East Broad Street, Richmond, Virginia 23219. The following detailed topographic quadrangle maps cover the stops described in this log: Edinburg, Front Royal, Hayfield, Middletown, Staunton, Stokesville, Strasburg, Stuarts Draft, Timberville and Toms Brook; they are available from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, Virginia 22903 for 75 cents each plus 4 percent sales tax for Virginia residents. *Permission should always be obtained before entering private property, as failure to do so violates trespass laws and is punishable under law.* The road log begins at Hayfield, Frederick County and ends at Folly Mills, Augusta County. Distances between points of interest, as well as cumulative mileage, are shown.

Cumulative miles (km)	*Distance*	*Explanation*
0.0 (0.0)	0.0 (0.0)	**STOP 1.** Hayfield, Virginia at the junction of U.S. Highway 50 and State Road 600. An almost complete section of the Needmore Formation is exposed on the north side of the junction. Proceed east on U.S. Highway 50.
0.8 (1.3)	0.8 (1.3)	Hogue Run.
1.1 (2.8)	0.3 (0.5)	Note good exposures of the Brallier Formation on the north side of highway.
1.9 (3.1)	0.8 (1.3)	Note exposures of the redbeds of the upper Chemung Formation.
2.5 (4.0)	0.6 (1.0)	Note good exposures of Chemung Formation on both sides of highway.

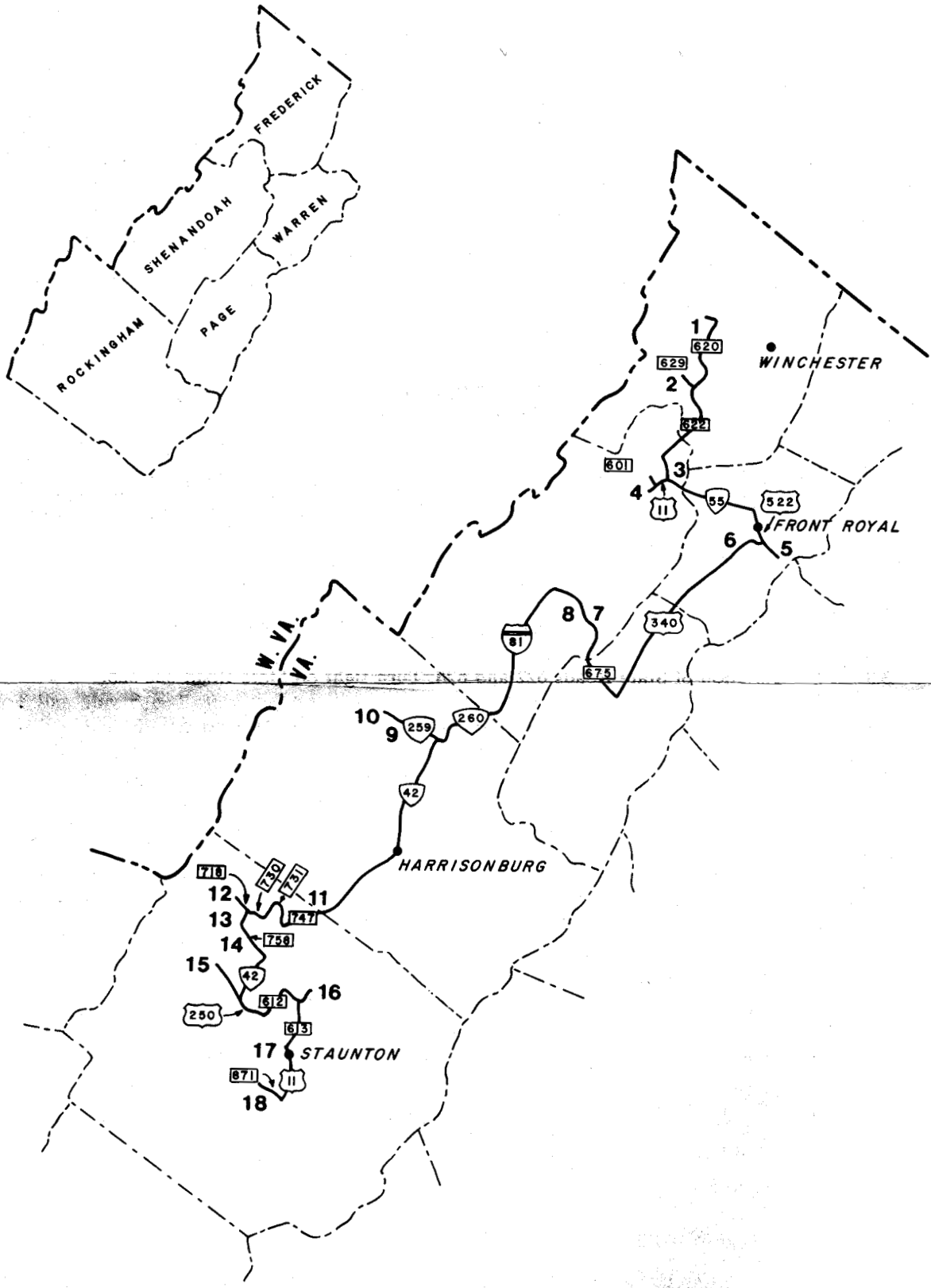

Figure 1. Road-log route for northern Appalachian Valley of Virginia.

Cumulative miles (km)	*Distance*	*Explanation*
3.0 (4.8)	0.5 (0.8)	Note good exposures of Chemung Formation (fossilferous).
3.7 (6.0)	0.7 (1.1)	Junction of U.S. Highway 50 and State Road 803. Turn right on State Road 803.
4.1 (6.6)	0.4 (0.6)	Junction of State Roads 803 and 620. Turn right on State Road 620.
4.4 (7.1)	0.3 (0.5)	Note Little North Mountain to the west (right).
6.5 (10.5)	2.1 (3.4)	Junction of State Roads 620 and 622. Turn right on State Road 622.
12.0 (19.3)	5.5 (8.8)	Junction of State Road 622 and 629. Turn right on State Road 629.
12.4 (19.9)	0.4 (0.6)	**STOP 2.** Fawcett Gap in Little North Mountain. The topographic form of Little North Mountain does not exist for about 0.5 mile (0.8 km) due to faulting. The major fault (North Mountain fault) if 900 feet (274 m) east of the gap. In the gap the entire exposed section is overturned with Martinsburg shale overlying 5 feet (2 m) of Silurian quartzite which overlies black fissile shale of the Marcellus. See Butts and Edmundson (1966, p. 76-86) for a discussion of Little North Mountain in Frederick County. Proceed west on State Road 629.
12.5 (20.1)	0.1 (0.2)	Turn around in driveway and proceed east on State Road 629.
13.0 (20.9)	0.5 (0.8)	Junction of State Roads 629 and 622. Turn right on State Road 622.
16.3 (26.2)	3.3 (5.3)	Junction of State Roads 622 and 628. Turn right on State Road 622-628.
16.4 (26.4)	0.1 (0.2)	Junction of State Roads 622 and 628. Turn left on State Road 622.
20.3 (32.7)	(3.9) (6.3)	Cedar Creek; Shenandoah-Frederick county boundary.
22.6 (36.4)	2.3 (3.7)	Junction of State Road 622 and State Highway 55. Turn left on State Highway 55.
24.8 (39.9)	2.2 (3.5)	**STOP 3.** Park on right side of highway. Type locality of the Oranda Formation (modified after Cooper and Cooper, 1946, p. 87-88). Proceed eastward on State Highway 55.
25.3 (40.7)	0.5 (0.8)	Junction of U.S. Highway 11 and State Highway 55. Turn right on U.S. Highway 11-State Highway 55.
25.5 (41.0)	0.2 (0.3)	Junction of U.S. Highway 11 and State Highway 55. Turn right on U.S. Highway 11.
27.5 (44.2)	2.0 (3.2)	Junction of U.S. Highway 11 and State Road 601. Turn right on State Road 601.
27.8 (44.8)	0.3 (0.6)	**STOP 4.** Park vehicle on west side of bridge and walk back across bridge. This is the best exposed section of the Middle Ordovician limestones in the Shenandoah Valley (modified after Cooper and Cooper, 1946, p. 76, 87-88, 95-96):

Thickness feet (m)

Oranda Formation
Limestone, shale, and siltstone; exposed along U.S. Highway 11 about 1,000 feet (274 m) north of Tumbling Run; brachiopods and trilobites common 50.0 (15.2)

Edinburg Formation (530 feet or 162 m)
Limestone, crumbly, cobbly, gray; *Camarocladia* (sponge) (Lantz Mills) 40.0 (12.2)

Cumulative miles (km)	*Distance*	*Explanation*	*Thickness feet (m)*
		Limestone, dark-gray, dense, slabby to cobbly; contains algae and corals (Lantz Mills)	200.0 (61.0)
		Limestone, dense, black, evenbedded; contains algae and corals (Liberty Hall)	64.0 (19.5)
		Limestone, clayey, shaly, cobbly; contains algae and corals (Lantz Mills)	26.0 (7.9)
		Limestone, medium-bedded, slabby, black (Liberty Hall)	22.0 (6.7)
		Limestone, very clayey, nodular (Lantz Mills)	9.0 (2.7)
		Limestone, dense, black, partings of black (Liberty Hall)	14.0 (4.3)
		Limestone, nodular to cobbly; contains algae and corals (Lantz Mills)	26.0 (7.9)
		Limestone, dense, black, slabby; contains several genera of trilobites; Mastopora (algae) also plentiful but none below this unit (Liberty Hall)	45.0 (13.7)
		Limestone, argillaceous, cobbly; contains abundant brachiopods (Lantz Mills)	20.0 (6.1)
		Limestone, nodular, buff, shaly; contains cystoids, corals, brachiopods, and trilobites (Lantz Mills)	33.0 (10.1)
		Limestone, granular; good ledge maker (Liberty Hall)	9.0 (2.7)
		Limestone, cobbly, buff, bright buff shale partings (Lantz Mills)	3.25 (1.54)
		Siltstone, brownish-buff, shaly in lower part	7.75 (0.84)
		Metabentonite, buff	0.80 (0.24)
		Chert	0.10 (0.03)
		Limestone, cobbly; clayey partings probably metabentonitic (Lantz Mills)	7.00 (2.13)
		Limestone, irregularly bedded, medium-to-coarse-grained	7.33 (2.23)
		Metabentonite, buff	0.67 (0.20)
		Lincolnshire Formation (132 feet or 40 m) Limestone, fine-grained, cobbly, sparsely cherty	27.0 (8.2)
		Limestone, dense, black; brachiopods common	35.0 (10.7)
		Limestone, dark-gray, granular, cherty; contains intercalated beds and lenses of coarse-grained limestone crowded with *Girvanella* (algae)	32.0 (9.7)
		Limestone, fine to medium-grained, cherty, black	29.0 (8.8)
		Limestone, thin-bedded, platy, dark-gray; no chert	4.5 (1.4)
		Limestone, coarse-grained, medium-gray; no chert	4.5 (1.4)
		New Market Limestone (56 feet or 17 m) Limestone, dove-gray, compact, pure; typical of high-calcium limestone of Shenandoah Valley; contains *Tetradium syringoporoides* (coral)	35.0 (10.7)
		Limestone, dove-gray, compact, thin-bedded; few impure beds near base	21+($6\pm$)
		Rockdale Run Formation (not measured) Turn around and proceed east on State Road 601.	
28.2 (45.4)	0.4 (0.6)	Junction of State Road 601 and U.S. Highway 11. Note exposures of lower Martinsburg black shale to the south.	

Cumulative miles (km)	*Distance*	*Explanation*
30.2 (48.6)	2.0 (3.2)	Junction of U.S. Highway 11 and State Highway 55 in Strasburg. Continue straight on State Highway 55.
34.7 (55.8)	4.5 (7.2)	Note Massanutten Mountain on south (right).
36.9 (59.4)	2.2 (3.5)	Note exposures of the flysch sequence of the Martinsburg Formation on right.
40.9 (65.8)	4.0 (6.4)	Junction of State Highway 55 and U.S. Highway 522. Turn right on U.S. Highway 522-State Highway 55. Note flood plain and low terrace along South Fork of Shenandoah River.
41.3 (66.5)	0.4 (0.6)	Junction of U.S. Highway 522 and State Highway 55. Turn left on U.S. Highway 522.
42.9 (69.0)	1.6 (2.3)	Junction of U.S. Highway 522 and State Highway 55. Continue straight on U.S. Highway 522.
43.8 (70.5)	0.9 (1.4)	**STOP 5.** Park on right side of road. The greenstone of the Catoctin Formation is well exposed at this stop. Greenstone, a product of low-grade regional metamorphism of a basalt flow, comprises the bulk of the Catoctin in the area. Columnar jointing is well developed in the rocks. Light-green masses of epidote with fibrous asbestos are common. Turn around and head west on U.S. Highway 522.
44.7 (71.9)	0.9 (1.4)	Junction of U.S. Highway 522 and State Highway 55. Turn left on State Highway 55.
45.2 (72.7)	0.5 (0.8)	Junction of State Highway 55 and U.S. Highway 340. Turn left on U.S. Highway 340.
45.6 (73.4)	0.4 (0.6)	Entrance to Shenandoah National Park.
46.9 (75.5)	1.3 (2.1)	Note good exposure of Rockdale Run (Beekmantown) Formation.
49.3 (79.3)	2.4 (3.9)	**STOP 6.** Park on left side of highway at store. On the west side of highway a breccia composed of carbonate blocks replaced by quartz and iron oxide is exposed. The breccia is between terrace gravels and limestone and dolomite of the Rockdale Run Formation. Continue south on U.S. Highway 340.
50.1 (80.6)	0.8 (1.3)	Gooney Creek Campground on the left. About 50 yeards (46 m) east of the entrance the Precambrian Pedlar Formation is faulted over the overturned Rockdale Run Formation.
52.0 (83.7)	1.9 (3.1)	Turn off to Thunderbird Museum and Archeological Park.
52.6 (84.7)	0.6 (1.0)	Note Massanutten Mountain to west and Blue Ridge to east.
54.4 (87.6)	1.8 (2.9)	Bentonville.
63.9 (102.8)	9.5 (15.3)	Note New Market Gap to the southwest.
69.2 (111.4)	5.3 (8.6)	Junction of U.S. Highway 340 and 211 Bypass. Continue straight on 340.
69.7 (112.2)	0.5 (0.8)	Junction of U.S. Highway 340 and Mechanic Street (State Road 675). Turn right on Mechanic Street.
73.4 (118.1)	3.7 (6.0)	Junction of State Roads 675 and 684. Continue left on 675.
73.8 (118.8)	0.4 (0.6)	Junction of State Roads 675 and 615. Continue right on 675.
76.7 (123.5)	2.9 (4.7)	Top of Massanutten Mountain; good view of South Fork of Shenandoah River and Blue Ridge.

Cumulative miles (km)	*Distance*	*Explanation*
78.2 (126.8)	1.5 (2.4)	Page-Shenandoah county boundary.
78.5 (126.3)	0.3 (0.5)	Junction of State Roads 675 and 730. Bear right on 675.
82.0 (132.0)	3.5 (5.6)	Junction of State Roads 675 and 678. Bear left on 675.
83.4 (134.2)	1.4 (2.2)	**STOP 7.** Park on right at spring. East of spring the Silurian Bloomsburg Formation is exposed. A white sandstone which may be a tongue of the Williamsport sandstone is present near the middle of the formation. West of the spring the Massanutten Sandstone is well exposed. Continue on State Road 675.
84.0 (135.2)	0.6 (0.1)	Edinburg Gap.
85.4 (137.4)	1.4 (2.2)	**STOP 8.** Park on either right or left as space is available. Martinsburg Formation is well exposed. Interbedded shale and lithic sandstone with graded bedding; fossils; minor (?) folding; and cleavage-bedding relations may be observed at this stop. Continue on State Road 675.
88.1 (141.8)	2.7 (4.4)	Junction of State Roads 675 and U.S. Highway 11. Turn left on U.S. Highway 11.
88.7 (142.8)	0.6 (1.0)	Junction of U.S. Highway 11 and State Highway 185. Turn right on State Highway 185.
89.7 (144.4)	1.0 (1.6)	Junction of State Highway 185 and Interstate Highway 81. Turn south (left) on Interstate Highway 81.
95.7 (154.1)	6.0 (9.7)	Mt. Jackson.
104.6 (168.3)	8.9 (14.3)	Junction of Interstate Highway 81 and State Highway 260 at New Market. Turn right (west) on 260.
105.4 (169.6)	0.8 (1.3)	Note flood plain of the North Fork of the Shenandoah River to the right (north).
106.0 (170.6)	0.6 (1.0)	Shenandoah-Rockingham county boundary.
106.8 (171.9)	0.8 (1.3)	Junction of State Highway 260 and State Road 260. Fossils in the Stonehenge limestone south of State Road 260.
108.4 (174.4)	1.6 (2.6)	Note wide flood plain of the North Fork of the Shenandoah River to the right (north).
110.2 (177.3)	1.8 (2.9)	Junction of State Highways 260 and 42 in Timberville, Turn left (south) on 42.
111.4 (179.3)	1.2 (2.0)	Note sinkholes on right (west).
111.6 (179.6)	0.2 (0.3)	Junction of State Highways 42 and 259. Turn right (west) on State Highways 42-259.
111.8 (179.9)	0.2 (0.3)	Note exposures of Beekmantown, New Market, Lincolnshire, and Edinburg formations. See Brent, 1960, p. 67, Geol. Sec. 5 for a detailed description of these exposures.
112.2 (180.6)	0.4 (0.6)	Junction of State Highways 42 and 259. Continue straight (west) on State Highway 259.
116.5 (187.5)	4.3 (6.9)	Junction of State Highway 259 and State Road 613 at Cootes Store. Continue on State Highway 259.
117.2 (188.6)	0.7 (1.1)	**STOP 9.** Park on left beyond store. Directly across the highway two northwestward-dipping reverse faults are exposed. A wedge of fossiliferous *Orthorhynchula* beds (Martinsburg Formation) is exposed between the faults (Brent, 1960, p. 72, Geol. Sec. 13).

Cumulative miles (km)	*Distance*	*Explanation*
		An abnormal thickness of Upper Ordovician and Lower Silurian sandstone (more than 370 feet) is exposed west of the faults. The covered interval west of the sandstone contains the Rose Hill Formation. Fifty-three feet of Keefer sandstone is exposed west of the covered interval. The Middle and Upper Silurian formations are poorly exposed. Continue on State Highway 259.
117.7 (189.4)	0.5 (0.8)	**STOP 10.** Junction of State Highway 259 and State Road 612. Park vehicle at Chimney Rock V.F.W. Hall. The vertical Ridgeley Sandstone forms a prominent rib along the west side of Little North Mountain. *Costispirifer arenosus* and species of *Platyceras* are common in float blocks. Turn around and head east on State Highway 259.
122.2 (196.6)	4.5 (7.2)	Junction of State Highways 259 and 42 in Broadway. Turn right (south) on State Highways 42-259A.
124.9 (201.0)	2.7 (4.4)	Note exposures of black shale of the Edinburg Formation.
129.6 (208.6)	4.7 (7.6)	Junction State Highway 42 and State Road 721 at Edom. Continue on State Highway 42.
134.4 (216.3)	4.8 (7.7)	Y-intersection; bear right; continue on State Highway 42 through Harrisonburg.
135.3 (217.7)	0.9 (1.4)	Junction State Highway 42 and U.S. Highway 33. Continue on 42.
139.2 (224.0)	3.9 (6.3)	Junction State Highway 42 and 42-Bypass at Dayton. Continue straight on State Highway 42-Bypass.
141.9 (228.3)	2.7 (4.3)	Bridgewater; continue on State Highway 42.
143.0 (230.1)	1.1 (1.8)	North River bridge.
145.5 (234.1)	2.5 (4.0)	Rockingham-Augusta county boundary.
146.3 (235.4)	0.8 (1.3)	**STOP 11.** Junction of State Highway 42 and State Road 747. Turn left on State Road 747. Park vehicle on the right side of road. Several common Conococheague lithologies are exposed in the roadcut. Beginning with the westernmost outcrop the sequence is as follows: 6. Limestone and dolomite, medium-gray, fine-grained, sandy; 6 feet (2 m) thick. 5. Sandstone, dolomitic, with stringers of oolitic chert; 3 feet (1 m) thick. 4. Limestone and dolomite, medium-to-light-gray, fine-grained; sandy in part; 10 feet (3 m) thick. 3. Thombolite, medium-gray; 2.5 feet (0.8 m) thick. 2. Covered interval; 10 feet (3 m). 1. Sandstone, dolomitic with stringers of oolitic chert. 2.0 feet (0.5 m) thick. Similar beds are exposed in an abandoned quarry just south of the road (*private property*). Continue west on State Road 747.
147.3 (236.9)	1.0 (1.6)	Junction of State Roads 747 and 613. Turn left on State Road 747.
149.7 (240.8)	2.4 (3.9)	Junction of State Roads 747 and 731 at Mt. Solon. Turn right on State Road 731.
150.3 (241.8)	0.6 (1.0)	Note Elbrook shaly dolomite exposures on right. Small igneous (diabase) sill exposed.
150.4 (241.9)	0.1 (0.2)	Entrance to Natural Chimney Regional Park. Erosional towers of horizontally bedded shaly Elbrook dolomite. There is an entrance fee collected to view the Towers.

Cumulative miles (km)	*Distance*	*Explanation*
150.8 (242.6)	0.4 (0.6)	Junction of State Roads 730 and 731. Turn left on State Road 730.
152.4 (245.2)	1.6 (2.6)	Note flood plain of North River.
154.1 (247.9)	1.7 (2.7)	Note exposure of Hampshire Formation on right (north).
154.4 (248.4)	0.3 (0.5)	Junction of State Roads 718 and 730 at Stokesville. Turn right on State Road 718.
155.0 (249.3)	0.6 (1.0)	**STOP 12.** Park on left side of road. Coal, shale, sandstone, and conglomerate of the Pocono Formation are exposed on the north side of the road. The section is overturned. Continue on State Road 718.
155.3 (249.8)	0.3 (0.5)	Camp May Flather. Turn around and head east on State Road 718.
156.2 (251.3)	0.9 (1.5)	Junction of State Roads 718 and 730. Continue straight on State Road 730.
156.3 (251.4)	0.1 (0.2)	**STOP 13.** Park on right side of road. *Do not block campground entrance.* Examine red beds of the Upper Devonian Hampshire Formatin. Note gravel deposit overlying the red beds. Continue on State Road 730.
156.5 (251.7)	0.2 (0.3)	Junction of State Roads 730 and 763. Turn right on State Road 763.
157.5 (253.4)	1.0 (1.6)	Junction of State Roads 763 and 747. Turn left on State Road 747.
157.6 (253.5)	0.1 (0.2)	**STOP 14.** Park on right side of road. North end of the topographic expression of Little North Mountain in Augusta County. In the field north of the stop a slice of Tuscarora quartzite is exposed overlain by Millboro black shale and underlain by the Brallier Formation. Continue on State Road 747.
159.2 (256.1)	1.6 (2.6)	Junction of State Roads 747 and 758. Turn right on State Road 758.
160.0 (257.4)	0.8 (1.3)	Junction of State Road 757 and 758. Turn left on State Road 758.
161.6 (260.0)	1.6 (2.6)	Junction of State Road 758 and State Highway 42. Turn right on State Highway 42.
162.8 (261.9)	1.2 (2.0)	Parnassus.
163.2 (262.6)	0.4 (0.7)	Junction of State Road 760 and State Highway 42. Algal structure in Elbrook dolomite exposed 100 yards west along State Road 760.
168.6 (271.2)	5.4 (9.6)	Junction of State Highway 42 and U.S. Highway 250. Turn right (west) on U.S. Highway 250.
169.9 (273.3)	1.3 (2.1)	Lone Fountain.
171.7 (276.2)	1.8 (2.9)	**STOP 15.** Junction of U.S. Highway 250 and State Road 736 at Jennings Gap. Park along right side of U.S. Highway 250. Walk across the bridge and examine Tuscarora and Martinsburg. Note the absence of the Juniata and Oswego. The section is overturned and the Tuscarora rests in fault with the Millboro. The overturned Edinburg is in fault contact with the Martinsburg. Turn around and head east on U.S. Highway 250.
174.8 (281.2)	3.1 (5.0)	Junction of U.S. Highway 250 and State Highway 42. Continue on 250.
175.2 (281.9)	0.4 (0.7)	Churchville; continue on U.S. Highway 250.

Cumulative miles (km)	*Distance*	*Explanation*
178.9 (287.8)	3.7 (5.9)	Junction of U.S. Highway 250 and State Road 612. Turn left on State Road 612.
180.7 (290.7)	1.8 (2.9)	Junction of State Roads 612 and 742. Turn left on State Road 742.
183.1 (294.6)	2.4 (3.8)	Junction of State Roads 742 and 740. Turn right on State Road 742.
184.4 (296.7)	1.3 (2.1)	Junction of State Roads 742 and 613. Turn right on State Road 613.
184.8 (297.4)	0.4 (0.6)	Junction of State Roads 742 and 613. Turn left on State Road 742.
185.3 (298.2)	0.5 (0.8)	**STOP 16.** Park vehicle on right side of road. Nepheline syenite and teschenite dikes exposed near barn and on hillside east of barn. Note the intersection of nepheline syenite and teschenite on hillside east of the road. Turn around and head south on State Road 742.
185.8 (299.0)	0.5 (0.8)	Junction of State Roads 613 and 742. Turn left on State Road 613.
189.3 (304.5)	3.5 (5.6)	Junction of State Roads 613 and 626. Turn right on State Road 613.
191.9 (308.8)	2.6 (4.2)	Junction of State Road 613 (Springhill Road) and U.S. Highway 250 (Churchville Ave.). Turn right on U.S. Highway 250.
192.4 (309.6)	0.5 (0.8)	**STOP 17.** Turn right on A Street and park vehicle on right side of road (Figure 1). Walk back along U.S. Highway 250 and examine breccia associated with the Pulaski-Staunton fault. Elbrook dolomite to the east has been faulted over the Beekmantown. Large blocks (up to 8 feet or 2 m) of highly fractured limestone and dolomite cemented by calcite and dolomite are exposed in the fault zone (Rader, 1966, p. 320-321). Return to U.S. Highway 250 and follow to junction with U.S. Highway 11.
193.5 (311.4)	1.1 (1.8)	Junction of U.S. Highways 250 and 11. Turn right on North Augusta Street.
194.1 (312.4)	0.6 (1.0)	Junction of North Augusta and East Johnson streets. Turn left on East Johnson St.
194.3 (317.2)	0.2 (0.3)	Junction of E. Johnson St. and Commerce Ave. (U.S. Highway 11). Turn right on U.S. Highway 11.
198.7 (319.8)	4.4 (7.1)	Folly Mills Creek.
198.9 (320.0)	0.2 (0.3)	Junction of U.S. Highway 11 and State Road 871. Turn right on State Road 871.
199.4 (320.9)	0.5 (0.8)	**STOP 18.** Park vehicle along right side of road (Figure 1). Examine Folly Mills breccia. Blocks of limestone and dolomite cemented by white dolomite and minor calcide are exposed along the road over a distance of approximately 1,000 feet (305 m). The lack of fracturing in the blocks suggest that the breccia is of collapse origin (Radar, 1967, p. 22-23). Continue to bridge, turn around, and return to U.S. Highway 11.

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Table 1. — Generalized stratigraphic column for Frederick and Shenandoah counties (Modified from Butts and Edmundson, 1966; Young and Rader, 1974).

Age	Formation	Thickness
Mississippian	Pocono Fm.	
	Hampshire Fm.	3600
	Chemung Fm.	2000-2500
	Brallier Fm.	1700
Devonian	Mahantango Fm.	850-1100
	Marcellus Sh.	550-
	Needmore Fm.	115-175
	Ridgeley Ss.	10-200
	"New Scotland" Ls.	100-140
	New Creek Ls.	6-10
	Keyser Fm.	150-250
	Tonoloway Fm.	175-250
	Wills Creek Fm.	130-400
	Bloomsburg Fm.	0-300
Silurian	McKenzie Fm.	0-200
	Keefer Fm.	30-70
	Rose Hill Fm.	300-650
	Tuscarora Fm.	50-500
	Massanutten Ss.	850-1600
	Juniata Fm.	0-200
	Oswego Fm.	0-315
	Martinsburg Fm.	3000+
	Oranda Fm.	25-55'
Ordovician	Edinburg Fm.	400-600
	Lincolnshire Fm.	50-130
	New Market Ls.	50-250
	Rockdale Run Fm.	2500+
	Stonehenge Fm.	300-500
	Conococheague Fm.	2500 +
Cambrian	Elbrook Fm.	2500+

Table 2. — Generalized stratigraphic column for Warren and Page counties (Modified after Allen, 1966; Rader and Biggs, 1975).

Age	Formation	Thickness
	Mahantango Fm.	100+
Devonian	Marcellus Sh.	200+
	Needmore Fm.	150+
	Devonian ss.	30-50
	Devonian-Silurian ls.	40-60
Silurian	Wills Creek Fm.	150-200
	Bloomsburg Fm.	300
	Massanutten Ss.	400-800
	Martinsburg Fm.	3000+
	Oranda Fm.	10-20
Ordovician	Edinburg Fm.	400-500
	Lincolnshire Fm.	25-150
	New Market Ls.	0-40
	Rockdale Run Fm.	2400
	Stonehenge Fm.	300-650
	Conococheague Fm.	2300
	Elbrook Fm.	2000+
	Waynesboro Fm.	1100
Cambrian	Shady Fm.	1000-1200
	Antietam Fm.	400-800
	Harpers Fm.	2000
	Weverton Fm.	400-500
Precambrian(?)	Catoctin Fm.	1500-2500
Precambrian	Pedlar Fm.	

COAL STUDY

The Virginia Division of Mineral Resources has begun a field program to collect samples and geologic information in the Southwest Virginia coal field. James A. Henderson, Jr., Geologist, and other Division personnel will be visiting both surface and underground mining operations to obtain representative samples from as many coal beds as possible. Information resulting from this program will augment current knowledge of the State's coal resources and will also be entered into a computerized system known as the National Coal Resources Data System. This system will permit rapid storage, sorting, and retrieval of a wide range of information on the Nation's coal resources.

The Branch of Coal Resources of the U. S. Geological Survey and the U. S. Bureau of Mines have established separate but interlocking computer systems to store and compile coal data. Both agencies realized during the 1973 oil crisis that existing coal data were incomplete and that the then-existing methods of data handling were not able to respond to the vital need for information concerning the coal resources of the United States. Information that is now being gathered by the U. S. Geological Survey, Bureau of Mines, and other cooperating agencies such as the Virginia Division of Mineral Resources, will be entered into the new systems. Three types of information will be developed and computerized for the coal samples collected by the Division of Mineral Resources: (1) a complete geologic description of the coal, (2) a proximate and ultimate analysis by the U. S. Bureau of Mines, and (3) a trace element analysis by the U. S. Geological Survey. Tests will be made for 72 minor and trace elements or compounds such as iron, zinc, copper, nickel, and uranium. These data may be used to verify correlation of coal beds and to facilitate optimum end uses of the coal according to the individual bed characteristics. It has long been known that Virginia has large resources of superior coal and it is anticipated that the sampling program will demonstrate this fact. A geologic mapping program is currently underway by the U. S. Geological Survey to prepare geologic quadrangle maps similar to those produced in Kentucky.

When the U. S. Geological Survey's National Coal Resources Data System is in full operation in two or three years, it will be able to produce maps of coal resources according to specific parameters such as thickness of coal beds, overburden, sulfur and ash content, BTU values and other characteristics. The information that is collected by the Division, and also data in the National Coal Data System, will be available to the public. This information should be useful to coal producers, consumers, planners and others concerned with the State's most valuable mineral resource. Information derived from this program will be used by the Division of Mineral Resources in studies concerned with coal formation, occurence, characteristics, and the interrelationship between these and other factors.

NEWS NOTE

Piedmont Mineral Associates is conducting a program of underground drifting and bulk sampling at the 508-acre Cofer zinc-copper tract about three miles north of Mineral, Louisa County. The company has announced that this work has confirmed results of prior surface drilling and has resulted in a decision to advance the property to development status. Drifting in ore on the 160-foot level was reportedly completed during 1975 and a second accessway was completed to the surface. A decline to the 340-foot level is currently nearing completion, and about 1700 feet of drifting will be done at this lower level. The company is jointly operated by The New Jersey Zinc Company and Callahan Mining Corporation. The New Jersey Zinc Company has produced lead and zinc ore at underground mining operations in Wythe County, Virginia, for many years.

Louisa County has a long mining history dating back over 100 years. Sulfide deposits in the vicinity of Mineral were first mined in the 1800's for gossan iron ore for use in local iron furnaces. Later mining yielded copper ore, and large tonnages or pyrite that was used as a source of sulfur for the manufacture of sulfuric acid. Gold has been mined by underground, open pit, and placer methods in the Mineral area, and lead, zinc, and some silver have also been produced.

NEW FEATURES ON RECENT MAPS

Recently published revised quadrangle maps show the outlines, routes of access, and camping or picnic facilities for the following State Parks: Prince Edward (Green Bay quadrangle), Goodwin Lake (Green Bay), Bear Creek Lake (Gold Hill). The location of the boundary, type of terrain, and positions of streams can be seen for these State Game Management Areas—Elm Hill (John H. Kerr Dam quadrangle), James River (Howardsville), Hardware River (Scottsville and Diana Mills), and Amelia (Chula). The expansion of the city of Richmond including new industrial buildings, highways, and subdivisions is graphically displayed on the following new photorevised quadrangles—Bon Air, Chester, Drewrys Bluff, and Richmond. All of these maps can be ordered for $0.78 each from the Division sales office; if unfolded copies are desired add an additional $2 for each order of ten or less maps.

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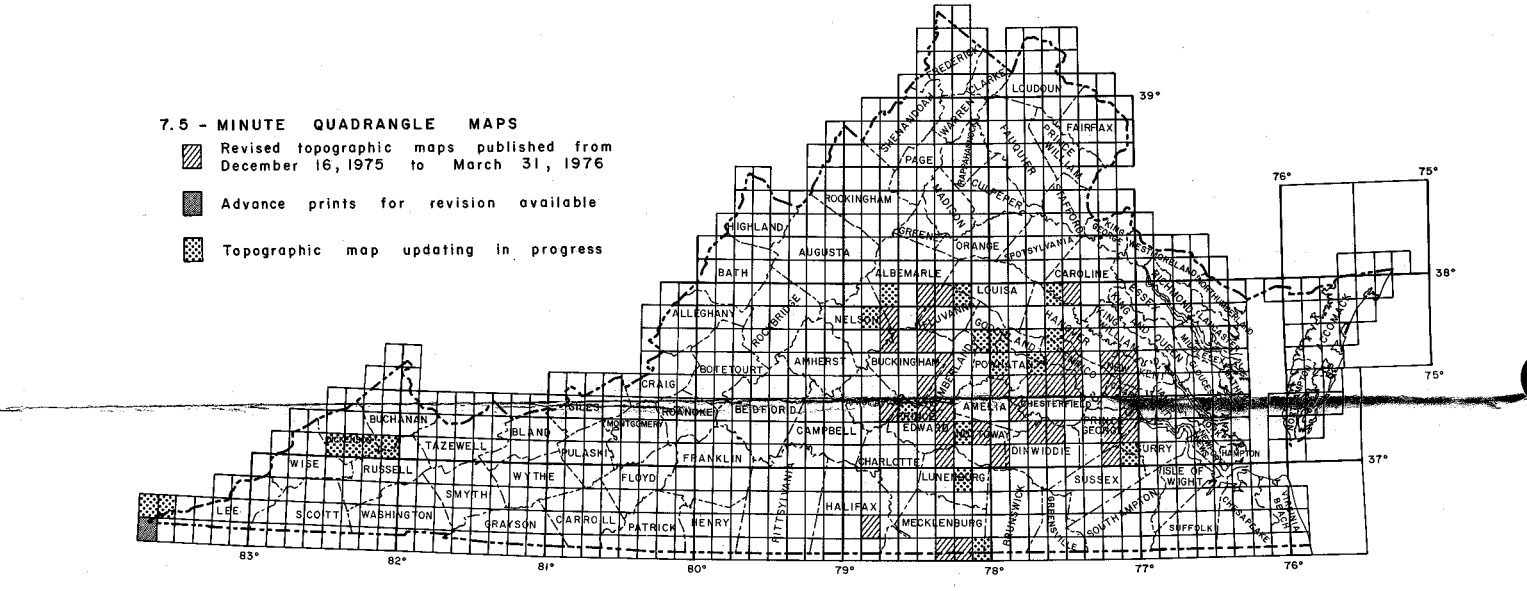
TOPOGRAPHIC MAPS



Revised 7.5-minute quadrangle maps published from December 16, 1975 to March 31, 1976:

Photorevised Maps

Beach	Chesterfield	Drewrys Bluff	John H. Kerr Dam	Rice	Schuyler
Blackstone East	Chula	Farmville	Meherrin	Richmond	Simeon
Bon Air	Church Road	Gold Hill	Omega	Roxbury	Sutherland
Boyd	Crewe East	Green Bay	Pamplin	Ruther Glen	Tunstall
Bracey	Diana Mills	Hallsboro	Providence Forge	Savedge	Willis Mountain
Charles City	Disputanta North	Howardsville	Quinton	Scottsville	Yellow Tavern

ADVANCE PRINTS

Advance prints are available at 75 cents each from the Eastern Mapping Center, Topographic Division, U. S. Geological Survey, Reston, Virginia 22092.

PUBLISHED TOPOGRAPHIC MAPS

Total State coverage completed; index is available free. Updated photorevised maps, on which recent cultural changes are indicated, are now available for certain areas of industrial, residential, or commercial growth. Published maps for all of Virginia are available at 75 cents each (plus 4 percent State sales tax for Virginia residents) from the Virginia Division of Mineral Resources, Box 3667, Charlottesville, Virginia 22903.